Algebra and graphs – 2024 O Level Math D 4024

1. June/2024/Paper_ 4024/11/No.6

(a) Simplify $6r+7s-r+3s$.

..... [2]

(b) Bananas cost x cents each.
Apples cost y cents each.

Write an expression for the total cost of 7 bananas and 5 apples.

..... cents [1]

2. June/2024/Paper_ 4024/11/No.12

Solve.

$$4(2x-3)+5(x+5)=20$$

$x =$ ..... [3]

3. June/2024/Paper_ 4024/11/No.14

Solve the simultaneous equations.
Show all your working.

$$2x+3y=7$$
$$x-6y=6$$

$x =$ .....

$y =$ ..... [3]

4. June/2024/Paper_ 4024/11/No.19

$f(x) = 2x - 5$

(a) Find $f(11)$.

..... [1]

(b) Find $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

(c) Solve $f(x) = x^2 + x - 11$.

$x =$ ..... or $x =$ ..... [3]

5. June/2024/Paper_ 4024/11/No.22

$$a = \frac{5b + 2x}{x - 3}$$

Rearrange the formula to make x the subject.

$x =$ ..... [3]

6. June/2024/Paper_ 4024/12/No.9

There are red pens, blue pens and black pens in a box.

There are x red pens.
The number of blue pens is 5 more than the number of red pens.
The number of black pens is 2 times the number of blue pens.

(a) Write an expression, in terms of x, for the total number of pens in the box.
Give your expression in its simplest form.

..... [2]

(b) The total number of pens in the box is 27.

Find the number of red pens in the box.

..... [2]

7. June/2024/Paper_ 4024/12/No.12

(a) $a = 5b + 7$

Find the value of a when $b = -2$.

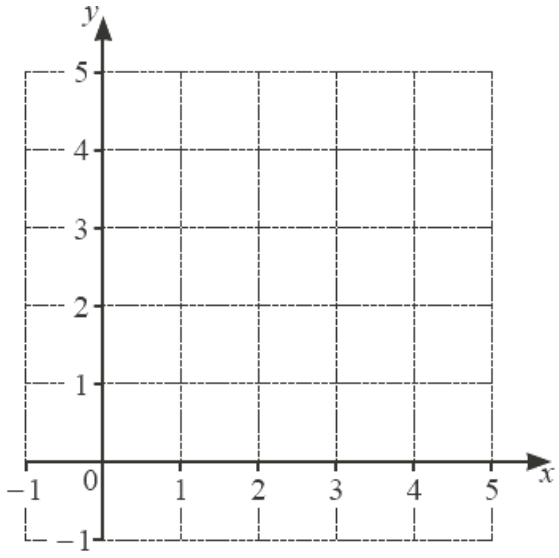
$a =$ ..... [1]

(b) $c = 4d - 9$

Rearrange the formula to make d the subject.

$d =$ ..... [2]

8. June/2024/Paper_ 4024/12/No.16



The region R is defined by these inequalities.

$$y \geqslant 2x$$

$$x + y \leqslant 4$$

$$x \geqslant 0$$

Find and label region R. [3]

9. June/2024/Paper_ 4024/12/No.18

(a) Evaluate $125^{-\frac{1}{3}}$.

..... [1]

(b) Simplify $\left(\frac{a^3}{4a}\right)^{\frac{3}{2}}$.

..... [2]

10. June/2024/Paper_ 4024/12/No.19

(a) The mass of a bag of almonds is 125 g, correct to the nearest gram.

Write down the lower bound of the mass of the bag of almonds.

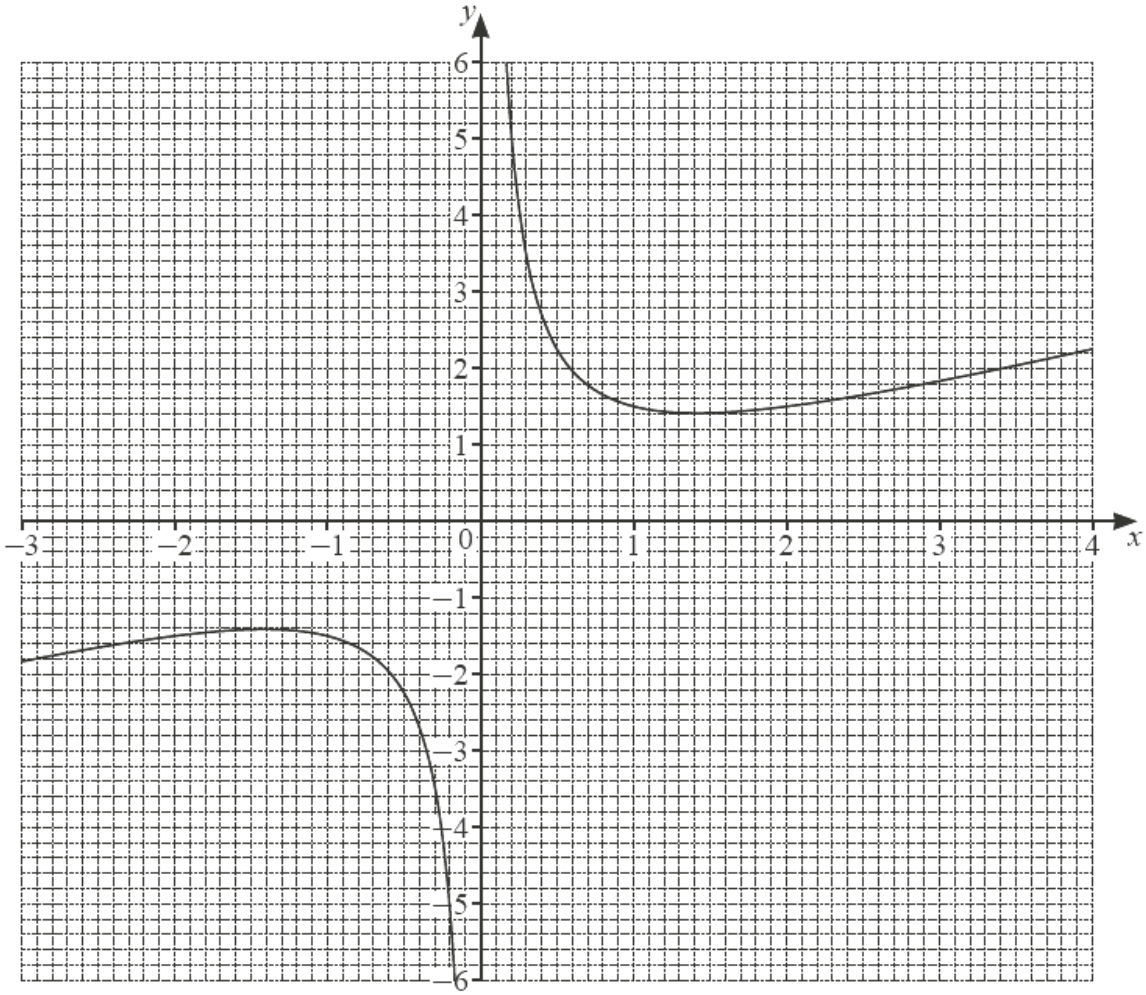
..... g [1]

(b) The mass of a large box is 500 g, correct to the nearest 10 grams.
The mass of a small box is 250 g, correct to the nearest 10 grams.

Calculate the upper bound of the difference between the mass of a large box and the mass of a small box.

..... g [2]

11. June/2024/Paper_ 4024/12/No.22



The diagram shows the graph of $y = \frac{1}{x} + \frac{x}{2}$.

(a) By drawing a tangent, estimate the gradient of the curve when $x = 2$.

..... [2]

(b) By drawing a suitable line on the grid, find the solutions of $\frac{1}{x} - \frac{5x}{2} + 1 = 0$.

$x =$ ....., $x =$ ..... [3]

12. June/2024/Paper_ 4024/12/No.24

Solve $\frac{x}{x-1} - \frac{5}{x-3} = 1$.

$x =$ ..... [4]

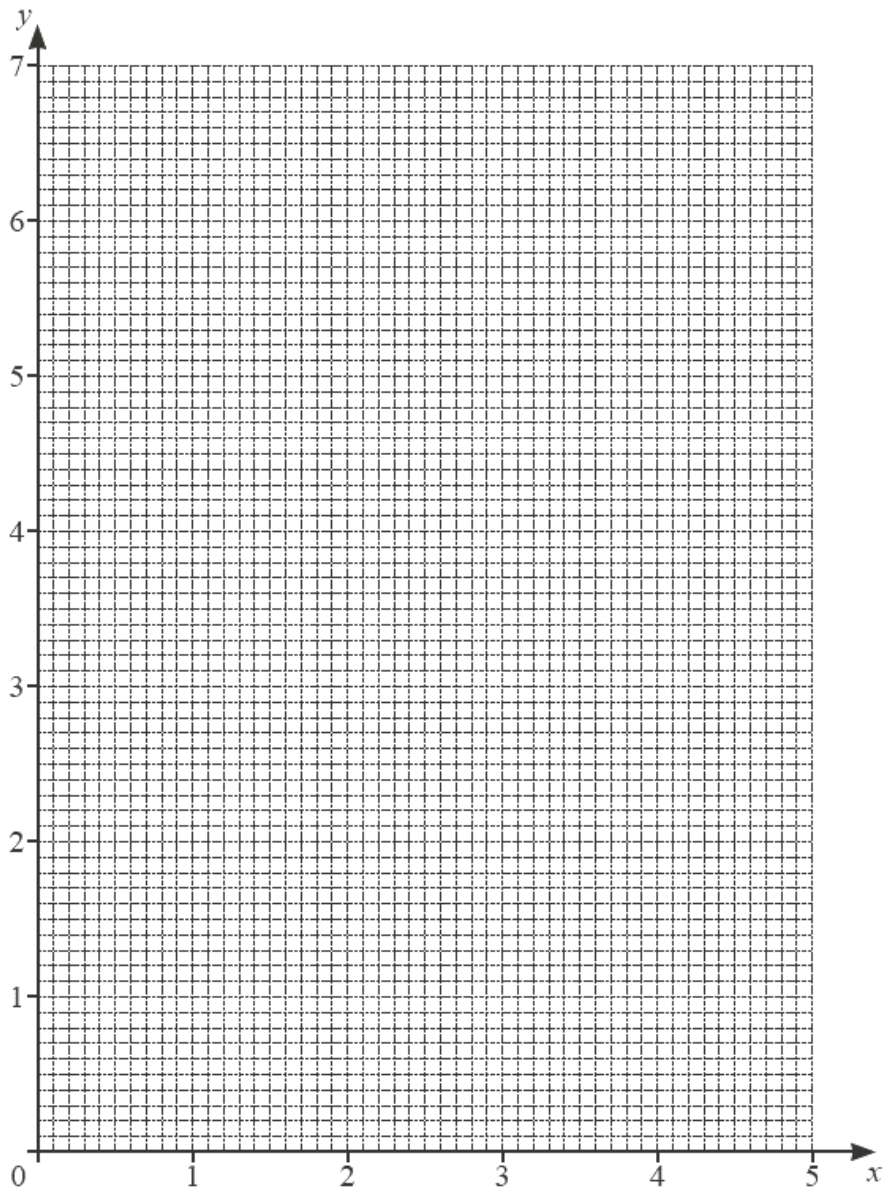
13. June/2024/Paper_ 4024/21/No.8

(a) (i) Complete the table for $y = \frac{2^x}{5}$.

x	0	1	2	3	4	5
y	0.2	0.4	0.8	1.6	3.2	

[1]

(ii) On the grid, draw the graph of $y = \frac{2^x}{5}$ for $0 \leqslant x \leqslant 5$.



[3]

14. June/2024/Paper_ 4024/21/No.10(a, c, d)

(a) $r = \dfrac{4p+3t}{2}$

Find the value of p when $r = 10$ and $t = -2$.

$p =$ ..... [3]

(c) Simplify $\frac{2k^2-5k-3}{k^2-9}$.

..... [3]

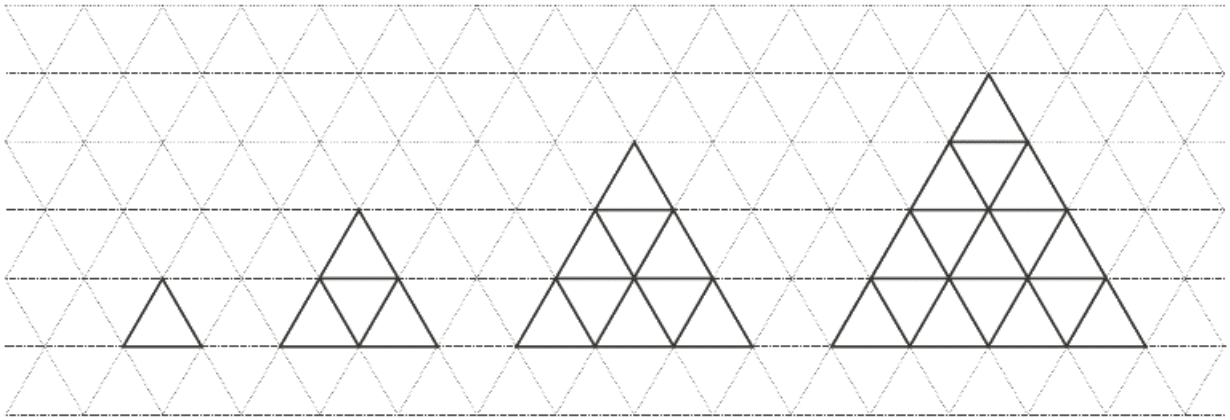
(d) Solve $\frac{2}{x+3}+\frac{5}{x-2}=1$.

Show all your working and give your answers correct to 2 decimal places.

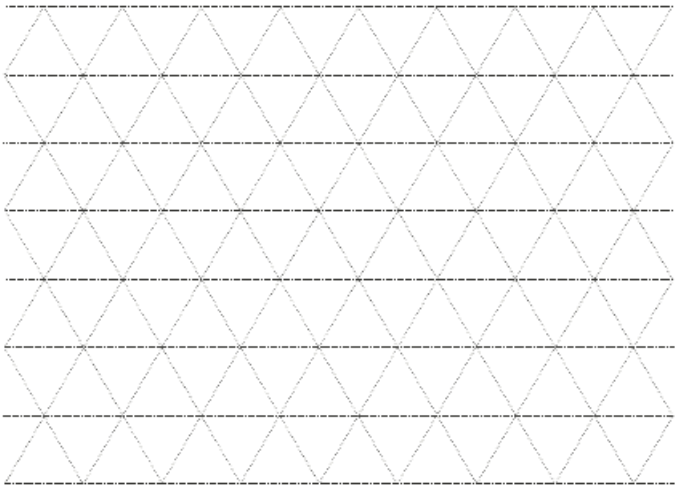
$x =$ ..... or $x =$ ..... [6]

15. June/2024/Paper_ 4024/22/No.4

(a) The diagrams show the first four patterns in a sequence.



(i) Draw Pattern 5 on the grid below.



[1]

(ii) Complete the table.

Pattern (n)	1	2	3	4	5	6
Total number of triangles	1	4	9	16		
Number of grey triangles	0	1	3			
Number of white triangles	1	3	6			

[2]

(iii) Write an expression, in terms of n, for the total number of triangles in Pattern n.

..... [1]

(iv) Write an expression, in terms of n, for the number of white triangles in Pattern n.

..... [2]

(b) The 3rd term of a linear sequence is 34.
The 8th term of the same linear sequence is 14.

(i) Find the value of the first term of this sequence.

..... [2]

(ii) Find the value of the first negative term of this sequence.

..... [1]

16. June/2024/Paper_ 4024/22/No.7

(a) Solve $\frac{x}{3} = 7$.

$x =$ ..... [1]

(b) Solve $6x - 5 = 2(x + 3)$.

$x =$ ..... [2]

(c) Factorise $3x^2 - 2x - 8$.

..... [2]

(d) $(ax+b)^2 = 4x^2 - 12x + c$

Given that $a > 0$, find the value of each of a, b and c.

$a =$ .....

$b =$ .....

$c =$ ..... [3]